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## SIMPLE SCIENCE—IRON.

Of the forty two metals which chemical research has extracted from the bowels of the earth none is so truly valuable to man as iron ; its uses are innumerable—every thing we have is manufactured by its means : its hardness and strength renders it a useful auxiliary in bracing wood work, and the peculiar property of welding which, except odium and platinum, no other metal possesses, renders iron the most suitable of all others for every common purpose. It becomes softer by heat and thus may be beaten into any form by the hammer, and united in as many parts as the workman pleases, without rivets and without solder.—Were it not for this peculiar property of iron many works of the utmost importance could never have been executed. The most stupendous fabric that I am at present aware of as achieved by means of *welded* iron is the Chinese *bridge of chains*, hung over a dreadful precipice in the neighbourhood of Kingtung, to connect two high mountains ; the chains are twenty-one in number, bound together by cross chains, so as to form a complete road from the summit of one immense mountain to that of another. Iron is plentifully and universally diffused among nature, pervading almost everything, and is the chief cause of colour in earths and stones.

Native metallic iron has been found in Siberia and Peru, in a state of mallebility, and yet in such enormous masses as to preclude the possibility of their being productions of art. Besides they are found entirely insulated and at great distances from any mountain, volcano, or bed of ore, from whence they might have been supposed to be derived. They are so similar in their composition to the meteoric stones that it is probable they have the same origin. Many very eminent philosophers consider these meteoric stones to have been projected from a volcano in the moon; the one which fell in the year 1751, near Agram, in Croatia, consists of 96½ per cent. iron and 3½ nickel. Fragments from the mass which lies in the great desert of Saharra were found by Mr. How, and to consist of 96 iron and 4 nickel, but there is an immense mass discovered many years ago in South America, and supposed to weigh thirty tons, which contained 13 parts of Nickel to 90 of iron. In the museum of the Academy of Sciences, at Petersburgh, there is a mass of native iron twelve hundred pounds weight, and in some of the northern parts of the world whole mountains are composed of iron ore. Some idea of the extent and importance of the iron trade may be formed from the fact that when the late Mr. Bacon obtained a lease of the iron and coal mines of a district eight miles long and four wide, near Merthyr Tydvill, that place was but an inconsiderable village ; since that time, however, these mines were leased by him to four distinct companies, and produce to his heirs a clear annual income of £10,000. That part occupied by Mr. Crawshay contains now the largest set of iron works in the kingdom. He constantly employs more than 2000 workmen, and pays *weekly* for wages, coal and other expenses of the works twenty-five thousand pounds. These works have conferred so much importance on the neighbourhood that the obscure village of Merthyr has bcome the largest town in Wales, and now contains more than twelve thousand inhabitants. That iron was in very early use and considered valuable, may be learned from Deuteronomy, viii. 9, in which Moses describes Canaan as "a land whose stones are iron, and out of whose hills thou mayest dig brass."

Iron is generally procured from the ore which when broken into small pieces and mixed with lime (which promotes its fusion) is thrown into a furnace, and baskets of coke or charcoal in due proportion are thrown in with it. This being kindled the blast of the great bellows is directed on it, and soon raises the whole to a most intense heat, and the reduced or melted metal drops down and collects at the bottom of the furnace ; more ore and fuel are supplied from above, and the operation goes forward until the melted metal at the bottom increasing in quantity, rises almost to the aperture of the blast, it is then let out by piercing the side of the furnace, and forms what are called pigs of *cast* iron. *Cast* iron in this state is easily melted, and hence it may be moulded into any form, and is employed in the fabrication of a vast variety of machinery and utensils.

To convert this *cast* into *wrought* or pure iron, it is kept in a state of fusion for a considerable time, and by repeated stirring the impurities are evaporated, and the metal becomes more infusible, for *pure* iron is *scarcely fusible*, after some time it gets stiff and thick, and the workmen know by this appearance that it is time to remove it from the furnace ; it is then submitted to the action of the hammer, or regular pressure of large steam rollers, by which the remaining impurities are forced out and the metal is rendered malleable and ductile.

To turn this *wrought* or pure iron into steel, it is only necessary to heat it in a proper furnace for several hours with charcoal or any substance capable of furnishing a sufficient quantity of carbon which is absorbed by the iron in the process.

Carburet of iron, very improperly called black lead, is charcoal and iron intimately combined ; the best is found at Borrowdale in Cumberland. Besides making pencils it preserves iron from rusting, and is used to rub over wooden machinery to prevent friction, and as it is nearly indestructible by fire, is often manufactured into crucibles.

Iron causes the beautiful colour of many precious stones. It gives the blue to the lapis lazuli, the yellow to the topas, and in the precious garnet there are 36 parts of oxide of iron in every 100. It gives the character to all our chalibeate waters, and in combination with sulphuric acid, forms the celebrated vitriolated waters at Shadwell and Swansea. In medicine it is generally considered a bracer of relaxed habits ; as steel, its flexibility renders it peculiarly fitted for the manufacture of watch springs ; and its ductility is so great that the most minute instruments are made of it, and a finer wire may be drawn from steel than from any other metal.

The most peculiar property of iron seems to be its power of magnetism. The natural magnet is a ponderous iron stone of a blackish colour. It is supposed to derive its magnetic power from the position in which it lay in the earth, for even a bar of *iron* if suspended in a particular direction for some time becomes magnetic. If one of these natural magnets be broken into pieces each piece will have the property of attracting iron and communicating to it magnetic power by friction—thus if a needle be rubbed FROM its eye TO its point a few times over the north pole of a magnet and then stuck in a small cork to swim on water, the eye will veer towards the north and the point towards the south. In this way the Chinese form their mariners compass, a guide on which they can rely at all times with perfect safety.

> "The obedient steel with living instinct moves,
> And veers for ever to the pole it loves."

The magnet has a power of repulsion as well as of attraction. Each natural magnet has an attracting and a repelling pole, and the space between the poles will neither attract nor repel. Thus when we present the north pole of a magnet, A, to the same pole of another, B, suspended on a pivot, and at liberty to move, the magnet B recedes as the other approaches, and by following it with A at a proper distance, may be made turn round on its pivot with considerable velocity, and this power has been made so great by a proper combination of magnets, that all the force of a strong man has been insufficient to make the two north poles touch each other. The Queen of Portugal was in possession of one of these natural magnets, of so large a size that it was capable of sustaining a weight of two hundred pounds ; it was a present from the Emperor of China to John V., King of Portugal. The late Doctor Godwin Knight possessed a surprising skill in magnetism, not only being able to communicate an extraordinary degree of attractive and repulsive virtue to his artificial magnets, but even to alter or reverse their poles at pleasure. This singular man refused every offer that was made him for the discovery of his method and to the last declared that the largest sum should not bribe him to divulge the secret, which of course died with him. The advantages we derive from the magnetic properties of iron are incalculable; by it man is enabled to steer his course across the desert deep, and open a friendly and commercial intercourse with every quarter of the globe. Of all the metals iron is certainly the most important, especially as it possesses so many properties, exists in so many different states, and is capable of being applied to such a variety of useful purposes. E. B.

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## ON WEARING THE MANUFACTURES OF OUR OWN COUNTRY AS A MEANS OF EMPLOYING THE POOR.

" Every stranger who travels through this beautiful island seldom finds much fault with the farm of a gentleman; but all his sympathies are called forward at seeing the miseries and wretched condition of the Irish cottager. As far as the eye can reach, tracts of ground are in the possession of these poor people, who, having nothing to lay out upon them but the sweat of their limbs, extort by reiterated toil, what will support their families and pay their rents, but are utterly unable to spare from such claims, a shilling to improvement. Persons of this description make the most part of the Irish community, and for many reasons, moral and political, their amelioration ought to be a matter of the first concern." This is the observation of a person generally esteemed an intelligent traveller, and there can be no doubt that the amelioration of the condition of the Irish labouring poor is a matter of prime importance. The most difficult point, however, appears to be how to give those who are capable of working, an alternative from the labours of the field in manufactures, and thus prevent such a pressure upon one source of income, as must inevitably lower the prices of labour, from the multitude of applicants. One great means of amelioration would be to inspire those persons who compose " the greater part of the Irish community" with that proper pride which would prevent their marrying till they have the means of supporting their wives and children upon better fare than potatoes and water. If these and a few other obvious sources of amelioration were assiduously followed up, we should no longer see immense tracts of grounds wasted under inadequate cultivation, and crowds of people in whom idleness engenders the propensity to turbulence, sharpened by that distress which arises from the discomfort of bad dwellings, scanty clothing and wretched fare, the consequences of improvident poverty. It is much to be desired that some person thoroughly acquainted with the subject would point out the particular manufactures that, unpreoccupied by England, could give support to our redundant population, which has increased, is encreasing, and ought not be diminished provided it be employed. It is true amongst individuals as among nations, that idleness is the parent of vice, and that the only lasting cure for disturbance here, will be found in giving occupation to the people, and inculcating upon their minds the principles of industry and right notions of independance.

Employment is always preferable to gratuitous assistance, because it sustains the dignity and independence of the human character, and keeps alive those feelings in the heart of man, which render him honest and useful—but how, will it be asked, is employment to be created? I will answer, *by wearing the manufactures of our own country.* In whatever degree this is done, in the same proportion will our poor be effectually relieved; but if it were *universally* practised, poverty might not disappear, but its worst consequences would vanish, and the face of the country instead of being disfigured and disgraced by swarms of mendicants, would assume a cheerful aspect, and that wholesome hue of industry, which is indicative of national prosperity.

Our linen has acquired perfection in its manufacture, why? because it is *universally worn.* The North exhibits an appearance as different as light and darkness, from the wretchedness of the South and West, why? because its *population is employed.* Such are the effects of using as a small portion of our clothing, the manufacture of our country—if it was entirely composed of materials worked up by our own people, those good effects would be still more widely extended, and every part of Ireland would gradually assume the grateful aspects of the northern districts.

If every man in Ireland determined *this day* to wear Irish woollen cloths, in three years that manufacture would equal any thing that England can produce; and if every woman came to the same determination, in the same period our cottons, cambrics, &c. would be on a par, if not superior to the British fabrics. That such an universal feeling should prevail, there is little hope; few people act upon system, or feel *rationally and judiciously* for the poor, though they have a tear for every novel, and a halfpenny for every street beggar; but there are still many who judge more wisely, and act more consistently, and *they* will, perhaps, listen to those suggestions and adopt them. Their example, by a happy contagion, may, perhaps, extend itself, and of this they may be assured, that wherever it prevails, the consequences to the poor and to themselves will be most favourable.

That some general measure of this kind *must* be proceeded upon, in behalf of the poor, there cannot be the shadow of doubt. If there are many *now* who suffer the penalties of indigence from the want of occupation, what will be the state of the country in but a few years hence, when its population may be increased by a third, or eventually doubled? Are the people, according to Swift's modest proposal, to eat one another, or to sit with their hands before them and die of want in the rags and tatters of garments made in another country?

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## GARDENER'S CALENDAR.

Beans may be planted about the middle or latter end of the month, and if they survive winter, will come in the earliest the next season; the early Mazangen or Lisbon kinds are to be preferred. About the end of this month the crops of red beet should be taken up, and stored for winter use; choose dry weather for this business: among dry sand in a cellar or other house where they may be preserved from frost or wet—if let to stay in the ground as practised by some, they must be covered with reeds, bean haulm, or the like—but in this way they are apt to rot. The crops of brocoli should now be cleared from weeds, and about the middle or latter end of the month, they should be finely moulded up for winter, observing to chuse a dry day for the operation. Cabbages sown in August, should now be put out in a dry light spot of ground, divided into four beds with twelve inch alleys between them; point over the surface, and break it fine—put in the plants three inches apart—each sort should be planted separately, and not too deep—at the same time a quantity may be planted out on good soil, well dug and manured, which if they weather the winter, (as they will do if not very severe indeed) will come in very early and acceptably in spring. There is another method of obtaining spring cabbages, which is to let the stems of a quantity of the spring or early summer planted ones remain in the ground. If the winter be open there will be a constant supply; the best sort to dress for this purpose are early dwarf or early York, as these cabbages are better and sooner than the other kinds. Carrots should now be lifted and stored for winter use—chuse a dry day for the business; and clean them from earth, then pare off the tops so as to prevent them from growing afterwards, to the depth of about half an inch, as by this treatment they keep better, and do not get soft in spring—they should be laid among dry clean sand, and secured from frost and damp. Put out a quantity of cauliflower plants, sown in August, under a wall or hedge, in light rich earth—point up and form a border for them, two feet broad, and place them three inches apart. Cauliflowers may be stored for winter use, under glasses, or in a common hot-bed frame well matted over in hard weather—they should be placed closely together, but not touching—exposed on fine days to the air, but covered at night and at all times from rain—or they may be preserved in a ruder kind of frame, made with coarse boards, and dry bricks, and defended from the weather; they may be thus kept if not over the winter, at least during the greater part of it, and will be found a most agreeable accession to the vegetable stores. Parsnips should be lifted and stored this month, as directed for carrots, or for want of room may be pitted in fine sandy earth. Peas may be sown at the latter end of this month they have a chance of weathering the winter—hoe and weed the crops of winter spinnage according as they may require, and put them in proper condition before winter.